

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
26 July 2001 (26.07.2001)

PCT

(10) International Publication Number
WO 01/53453 A2

- (51) International Patent Classification⁷: **C12N**
- (21) International Application Number: PCT/US00/34960
- (22) International Filing Date:
23 December 2000 (23.12.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
- | | | |
|------------|--------------------------------|----|
| 09/488,725 | 21 January 2000 (21.01.2000) | US |
| 09/552,317 | 25 April 2000 (25.04.2000) | US |
| 09/598,042 | 9 July 2000 (09.07.2000) | US |
| 09/620,312 | 19 July 2000 (19.07.2000) | US |
| 09/653,450 | 3 August 2000 (03.08.2000) | US |
| 09/662,191 | 14 September 2000 (14.09.2000) | US |
| 09/693,036 | 19 October 2000 (19.10.2000) | US |
| 60/250,583 | 30 November 2000 (30.11.2000) | US |

- (63) Related by continuation (CON) or continuation-in-part (CIP) to earlier applications:
- | | |
|----------|--------------------------------|
| US | 09/488,725 (CIP) |
| Filed on | 21 January 2000 (21.01.2000) |
| US | 09/552,317 (CIP) |
| Filed on | 25 April 2000 (25.04.2000) |
| US | 09/598,042 (CIP) |
| Filed on | 9 July 2000 (09.07.2000) |
| US | 09/620,312 (CIP) |
| Filed on | 19 July 2000 (19.07.2000) |
| US | 09/653,450 (CIP) |
| Filed on | 3 August 2000 (03.08.2000) |
| US | 09/662,191 (CIP) |
| Filed on | 14 September 2000 (14.09.2000) |
| US | 09/693,036 (CIP) |
| Filed on | 19 October 2000 (19.10.2000) |
| US | 60/250,583 (CIP) |
| Filed on | 30 November 2000 (30.11.2000) |

- (71) Applicant (for all designated States except US): **HYSEQ, INC.** [US/US]; 670 Almanor Avenue, Sunnyvale, CA 94086 (US).

- (72) Inventors; and

- (75) Inventors/Applicants (for US only): **FORD, John, E.** [US/US]; 2763 South Norfolk #210, San Mateo, CA 94403 (US). **BOYLE, Bryan, J.** [US/US]; 1947 10th Avenue,

San Francisco, CA 94116 (US). **TANG, Y., Tom** [US/US]; 4230 Ranwick Court, San Jose, CA 95118 (US). **LIU, Chenghua** [CN/US]; 1125 Ranchero Way #14, San Jose, CA 95117 (US). **ASUNDI, Vinod** [US/US]; 709 Foster City Boulevard, Foster City, CA 94404 (US). **CHEN, Rui-Hong** [US/US]; 1031 Flying Fish Street, Foster City, CA 94404 (US). **MA, Yunqing** [CN/US]; 280 W. California Avenue #206, Sunnyvale, CA 94086 (US). **REN, Feiyan** [US/US]; 7703 Oak Meadow Court, Cupertino, CA 95014 (US). **WANG, Jian-Rui** [CN/US]; 744 Stendahl Lane, Cupertino, CA 95014 (US). **WERHMAN, Tom** [US/US]; 3210 CCSR Mol Pharm, 269 W. Campus Drive, Stanford, CA 94035 (US). **XU, Chongjun** [CN/US]; 4918 Manitoba Drive, San Jose, CA 95130 (US). **XUE, Aidong, J.** [CN/US]; 1621 S. Mary Avenue, Sunnyvale, CA 94087 (US). **YANG, Yonghong** [CN/US]; 4230 Ranwick Court, San Jose, CA 95118 (US). **ZHANG, Jie** [CN/US]; 4930 Poplar Terrace, Campbell, CA 95008 (US). **ZHAO, Qing, A.** [CN/US]; 1556 Kooser Road, San Jose, CA 95118 (US). **ZHOU, Ping** [CN/US]; 1461 Japaul Lane, San Jose, CA 95132 (US). **DRMANAC, Radoje, T.** [YU/US]; 850 East Greenwich Place, Palo Alto, CA 94303 (US).

- (74) Agent: **ELRIFI, Ivor, R.**; Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., One Financial Center, Boston, MA 02111 (US).

- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

- (54) Title: NOVEL BONE MARROW NUCLEIC ACIDS AND POLYPEPTIDES

- (57) Abstract: The present invention provides novel bone marrow expressed nucleic acids, novel polypeptide sequences encoded by these nucleic acids and uses thereof.

WO 01/53453 A2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US00/34960

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C12N 15/11, 15/63, 15/70, 15/82; C07K 14/00
US CL : 536/23.1; 435/320.1, 455, 468; 530/300, 350

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 536/23.1; 435/320.1, 455, 468; 530/300, 350

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
STN, EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PHILLIPS et al. The genetic program of hematopoietic stem cells. Science. 02 June 2000, Vol. 288, pages 1635-1640.	1-11, 13-16, 19-26, and 29
Y	LELIAS et al. cDNA cloning of a human mRNA preferentially expressed in hematopoietic cells and with homology to a GDP-dissociation inhibitor for the rho GTP-binding proteins. Proc. Natl. Acad. Sci. USA. February 1993, Vol. 90, pages 1479-1483.	1-11, 13-16, 19-26, and 29
Y	MIRAGLIA et al. A novel five-transmembrane hematopoietic stem cell antigen: isolation, characterization, and molecular cloning. Blood. 15 December 1997, Vol. 90, pages 5013-5021.	1-11, 13-16, 19-26, and 29
Y	MOORE et al. Hematopoietic activity of a stromal cell transmembrane protein containing epidermal growth factor-like repeat motifs. Proc. Natl. Acad. Sci. USA. April 1997, Vol. 94, pages 4011-4016.	1-11, 13-16, 19-26, and 29

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *B* earlier application or patent published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

Z

document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

26 JUL 2001

Name and mailing address of the ISA/US

Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703)305-3230

Authorized officer

Michael Woodward

Telephone No. (703)-308-0196

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US00/34960

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please see continuation sheet.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-11, 13-16, 19-26, and 29, SEQ ID NO:1

Remark on Protest

☐
☐

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US00/34960

BOX II. OBSERVATION WHERE UNITY OF INVENTION IS LACKING (CONTINUATION)

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid. Group I, claims 1-11, 13-16, 19-26, and 29, drawn to nucleic acid molecules, vector molecules and host cells containing said nucleic acids, polypeptides, methods of making said polypeptides and method of detection using said nucleic acids and polypeptides.

Group II, claim 12 and 28, drawn to antibodies and method of treatment using composition comprising said antibodies.

Group III, claims 17-18, and 30, drawn to methods of identifying a binding partner to a polypeptides.

Group IV, claim 27, drawn to method of treatment using composition comprising polypeptides.

The inventions listed as Groups I-IV do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Group I encompasses nucleic acids, polypeptides expressed thereby, vectors and host cells containing same, respectively, and methods of making as well as the first method of use of this subject matter. Groups II-V all are directed to different special technical features as summarized as follows: Group II is directed to an antibody and method of treatment using same, which antibody undergoes recognition and binding reactions wherein what is bound is different from what is bound by the compositions of Group I. For example, the polypeptides of Group I do not bind the polypeptides of Group I as the antibody of Group II does. Identification of binding partner and treatment are clearly different special technical features from detection. Group III is directed to the identification of a binding partner of a polypeptide, which is not identified in any of the other Groups and thus clearly contains its own special technical feature. Group IV is directed to treatment, which is a clearly different methods than the methods in the other Groups. Thus, in summary, each of Groups I-IV are directed to different special technical features and thus support this lack of unity.

Additionally, each of the claims is directed to more than one sequences. These sequences are deemed to lack unity of invention because they are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for more than one sequences to be searched, the appropriate additional search fees must be paid. The sequences represent a series of polymucleotides and the polypeptides encoded thereby as represented by SEQ ID Nos: 1-113, 227-339, and 453-477. Each of these polymucleotide sequences encodes a separate polypeptide and thus represent a separate gene. Therefore, each of these sequences defines its own special technical feature.